California Regional Water Quality Control Board
Lahontan Region

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Gray Davis
Governor

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Commissioner Robert A. Laurie
California Energy Commission
1516 Ninth Street
Sacramento, CA 95814-5512

Dear Mr. Laurie:

SUITABILITY OF THE YUCCA MOUNTAIN, NEVADA SITE FOR THE LOCATION OF A HIGH-LEVEL RADIOACTIVE WASTE REPOSITORY

The Lahontan Regional Water Quality Control Board staff appreciates the opportunity to review the Draft *Environmental Impact Statement for a Geologic Repository for the Disposal of High-Level Radioactive Waste at Yucca Mountain, Nye County, Nevada* (DEIS). Regional Board staff comments generally are limited to the sections in Chapter 3, *Affected Environment,* and Chapter 4, *Environmental Consequences of Repository Construction, Operation and Monitoring, and Closure* that may have an effect on ground water quality down gradient of the site.

General Comments

There are many places in the text where qualitative terms such as "relatively little," "a small portion," or "relatively few" are used. These terms are virtually meaningless to a review. If the items described are important enough to discuss in the DEIS at least an estimate of the volumes, percentages, or whatever should be included in the text.

Based on the expectation of site-specific, health-based standards for radioactive releases from the repository, the Department of Energy (DoE) is proposing a repository system that is designed to fail, leak radionuclides into the environment, and hope that man-made barriers and the natural environment can dilute the radionuclide concentrations below these health-based limits before reaching the biosphere. However, based on the limited amount of data available, ground water appears to move through the saturated zone from Yucca Mountain to the accessible environment (20-30 km away) in less than the 10,000-year regulatory compliance period.

The DEIS summarizes extensive modeling efforts, based on very limited hard data, showing that the 25 millirem/year at 20 kilometers distance from the repository can be achieved. Rather than characterizing Yucca Mountain in terms of its suitability to contain the waste for the prescribed time period, DoE has spent most of their time and energy on the engineering aspects of site

development and waste placement. Significant uncertainties remain about the long-term performance of each proposed barrier and additional studies are needed to prove that containment can be achieved for the statutory 10,000-year compliance period

More data and, therefore better more realistic models are needed to demonstrate whether radionuclide travel times through the unsaturated zone are sufficiently long to allow the unsaturated zone to serve as a substantive natural component of the repository barrier design.

Specific Comments

§3.1.4.1.2 DoE correctly notes that precipitation is not uniform either spatially or temporarily at the site; e.g., most recharge occurs during the winter months. However, DoE never provides an estimate of the volume of water flux through the mountain nor is enough data available to determine what part of the mountain will be affected by the so-called "fast paths" through the mountain. DoE need to provide information on the water flux through Yucca Mountain and the most probable areas affected by the "fast paths" in the unsaturated zone.

Page 3-35, Table 3-10. The total dissolved solids values listed in the Table only range from 45 to 122 mg/L. However, the bicarbonate values alone are listed as ranging from 32 to 340 mg/L. Given the data presented in the table, TDS values should range from 51.5 to 516 mg/L. This discrepancy in the data table needs correction.

§3.1.4.2.1, Page 3-39, 4th paragraph. The DEIS states that "the primary ground water discharge points for this [Alkali Flat-Furnace Creek Ranch] sub-basin is Alkali Flat (Franklin Lake Playa) as indicated by the potentiometric surface of the ground water and hydrochemical data. A *small portion* (emphasis added) could move toward discharge points in the Furnace Creek area of Death Valley."

It is not clear, based on previous studies (some of which are not referenced in the DEIS) whether a flow path exists between the volcanic aquifer below Yucca Mountain and the springs emanating from the carbonate aquifer on the east side of Death Valley. What evidence is there to support this assertion and what quantity does DoE consider a "small portion?"

§3.1.4.2.2. It is significant that the character of the pore water from the rock matrix is chemically distinct from water found in fractures. It is also significant that water in the perched zones does not appear to receive a large contribution from the rock matrix; indicating all significant flow, both in terms of volume and velocity, is via fracture flow through the mountain. DoE should estimate at what level of precipitation (infiltration) fracture flow becomes the dominant flow path.

Table 3-14. Calling the basal vitrophyre and the Tram Tuff confining units seems to be little more than wishful thinking. Apparent hydraulic conductivities up to 40m/yr. in the Tram tuff are

not that much different than the underlying carbonate aquifer ("described as a "a regionally extensive aquifer system through which large amounts of ground water flow") displaying a permeability of 69 m/yr. Water percolating through the mountain will take the path of least resistance; therefore, the higher permeability value for the Tram Tuff is probably more indicative of its "typical" permeability.

§3.1.4.2.2, Page 3-52. DoE states that "the actual and relative amounts of inflow [into the volcanic aquifers below Yucca Mountain] from each (of the four potential) sources are not known." This is an essential piece of information necessary for any effective modeling of ground water flow from beneath the mountain and toward Franklin Playa. Any model lacking this information would not provide a meaningful or reliable characterization of ground water flow.

§3.1.4.2.2, Page 3-56. The data from Well JF-2a are troublesome. Why would this well exhibit a 27cm increase in elevation when all the other wells in the area exhibit 3- to 9-cm decreases? This apparent contradiction is glossed over in the text and not discussed except to relate the well locations to the proximity of Fortymile Wash. If wells JF-12, JF-13, and JF-3 were not pumped would their static levels also increase? By not providing an explanation of these static water levels, DoE indicates that the hydrogeology below and directly downgradient of Yucca Mountain is poorly understood. More data is necessary to both understand the down gradient hydrogeology and as input to more meaningful ground water modeling.

§4.1.3.2 There is some discussion here that water percolating into the repository drifts [if any] would be pumped to the surface. What is the maximum volume of water expected to percolate into the drifts?

§4.1.3.2, Page 4-22, 4th Paragraph states that 480 to 1,300 liters per year of cleaning solvents (described as "a relatively small quantity") would be used at the facility. DoE should redistill and reuse as much of these solvents as possible. A release of that magnitude reaching ground water could contaminate between 77,000 to 210,000 acre-feet of water to concentrations above the drinking water standard.

Page 5-10, last paragraph. DoE states that water "would drip into the repository but only in a *relative few* (emphasis added) places." What percentage of the repository does DoE estimate will be affected by dripping water?

It is amazing that, in a project that is to completely characterize the subsurface in and around Yucca Mountain, there has been no high-resolution geophysical surveys conducted to further delineate the geologic structures below Yucca Mountain that may enhance (of hinder) ground water flow. We recommend that such surveys be conducted as a very cost-effective way of gathering useful subsurface geologic information.

In summary, the hydrogeologic and geochemical characterization of Yucca Mountain and vicinity is not complete. Major uncertainties remain about the "fast paths" through the mountain and the flow paths from the underlying volcanic and carbonate aquifers to the alluvial aquifer in Amargosa Valley and possibly on to Death Valley. It is also unclear what effect the Ghost Dance fault (and other faults) east of the proposed facility could have on ground water flow. Currently, the ground water modeling performed on these flow paths, based on little or no information, is little more than conjecture.

Therefore, as it now stands, the DEIS is deficient, does not contain enough information to determine whether the site is suitable for a high-level radioactive waste repository, and does not contain enough definitive information to make a recommendation to the President. The DEIS should be revised to address these deficiencies before the project can proceed.

Should you have any questions regarding these comments, please telephone the undersigned at (760) 241-7384.

Sincerely,

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Lahontan Regional Water Quality Control Board